

## NEW SPECIES OF HYLID AND LEPTODACTYLID FROGS FROM SOUTHERN NEW GUINEA

by M. J. TYLER\* and F. PARKER†

### Summary

TYLER, M. J., & PARKER, F. (1974).—New Species of Hylid and Leptodactylid Frogs from southern New Guinea. *Trans. R. Soc. S. Aust.* 98 (2), 71-77. 31 May, 1974.

Two new species of frogs (a hylid and a leptodactylid) from southern New Guinea are described. Details of habitats and habits are provided, and an analysis of the mating call of the leptodactylid is included.

### Introduction

In a recent comparison of the Australian and Papuan frog faunas adjacent to Torres Strait, Tyler (1972a) indicated that few species are exclusive to the Papuan coastal area. However, it was noted that literature references to the occurrence there of the Australian leptodactylid *Crinia signifera* (Roux 1920; Van Kampen 1923; Parker 1940) antedated knowledge of the existence of a complex of species previously so identified (Moore 1954; Main 1957), and probably represented an undescribed species.

Tyler & Parker (1972) increased the known Papuan hylid frog fauna by describing *Litoria imida* from the upper tributaries of the Fly River, and from localities situated closer to the coast in the south-east of Papua New Guinea.

On 4 March, 1973, one of us (F.P.) collected eight species of frogs at Merauke, situated only 80 km west of the area from which the collections of Tyler & Parker (1972) were obtained. One of these species represents a previously undescribed hylid which we describe here. Moreover, we now have adequate material from previous collections in southern New Guinea to re-examine the taxonomic status of the leptodactylid.

*Crinia* Tschudi, as recognised by Parker (1940), is now regarded as constituting four distinct genera: *Asse* Tyler, *Crinia* Tschudi, *Geocrinia* Blake and *Ranidella* Girard (Tyler 1972b; Blake 1973). The *Crinia signifera* complex has been referred to *Ranidella* by Blake,

and the species that we describe here is a member of that genus.

### Methods

The specimens discussed here are deposited in the collections of institutions abbreviated in the text as follows: American Museum of Natural History (AMNH); Museum of Comparative Zoology (MCZ); Naturhistorisches Museum Basel (NMB); South Australian Museum (SAM), and Department of Biology, University of Papua New Guinea (UPNG).

The methods of measurement and morphological and descriptive terminology follow those of Tyler (1968). The descriptive abbreviations used are: E (horizontal diameter of the eye); E-N (distance between the eye and the naris); IN (internarial span); HL (head length); HW (head width); S-V (snout to vent length); and TL (tibia length). Techniques of call recording and analysis follow Tyler & Menzies (1971).

Merauke is situated approximately 80 km west, Gubam 30 km east, and Mata 10 km east, of Morhead (Tyler & Parker 1972, Fig. 1).

### *Litoria quadrilineata* n.sp.

*Holotype*: SAM R13489. An adult male collected on land adjacent to the Post Office, Jalan Trikora (=Trikora Road), at Merauke, Irian Jaya (formerly West Irian), New Guinea, by F. Parker on 4 March, 1973.

*Definition*: A small lowland species (males 27.4-30.5 mm S-V) characterised by a narrow

\* South Australian Museum, North Terrace, Adelaide, S. Aust. 5000.

† Wildlife Section, Dept. of Agriculture Stock and Fisheries, Konedobu, Papua New Guinea.

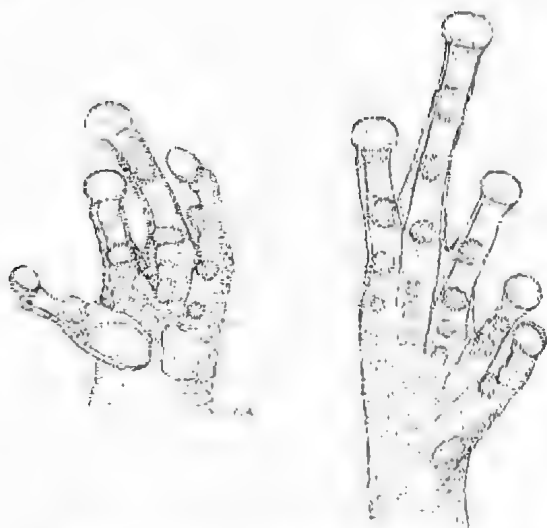


Fig. 1. Hand and foot of *Etorfia quadrilineata*.

and rather elongated head and body, short limbs, unwebbed fingers, vestigially webbed toes and four dark, longitudinal stripes on the lateral and dorsal surfaces of the body.

**Description of Holotype:** The head is high, triangular when viewed from above, and longer than broad (HL/HW 1.089), its length equivalent to slightly more than one-third of the snout to vent length. The snout is high and prominent when viewed from above, rounded and projecting beyond the anterior limit of the mandible in profile. The nostrils are situated laterally, their distance from the end of the snout being approximately one-half that from the anterior margin of the eye. The distance between the eye and the naris is greater than the internarial span (E-N/IN 1.083). The canthus rostralis is of moderate length, clearly defined and very slightly curved, whilst the loreal region is markedly concave. The eye is of moderate size and not conspicuously prominent, its diameter equivalent to the distance between the eye and the naris. The tympanum is conspicuous, with a narrow annulus partly hidden superiorly by a supra-tympanic fold. The tympanic diameter is equivalent to approximately one-half of the horizontal diameter of the eye. Vomerine teeth are absent: there is a slightly raised elevation on the left side but not on the right. This elevation is situated between the choanae. The tongue is broadly oval with a very weak posterior indentation.

The fingers are long, slender, unwebbed, and possess only extremely slender lateral fringes (Fig. 1). The decreasing order of length of the fingers is  $3 > 4 > 2 > 1$ . The terminal discs are moderate, the diameter of the discs of the third finger being approximately one and one-half times the diameter of the penultimate phalanx.

The hind limbs are relatively short and slender, with a TL/S-V ratio of 0.407, and toes in decreasing order of length  $4 > 5 > 3 > 2 = 1$ . Only a vestigial trace of webbing occurs between the fourth and the fifth, and third and fourth digits (Fig. 1). There is a small circular inner but no outer metatarsal tubercle.

The dorsal surfaces of the head, body and limbs are minutely granular. Distinct tubercles are lacking. The skin of the throat and chest lacks tubercles, but is greatly folded and convoluted in association with the vocal sac, and is clearly a reflection of the calling activity of the specimen prior to preservation. The abdomen and ventral surfaces of the femora are granular. There is an extremely prominent gland at the post-articular margins of the mandibles.

This male specimen has a large, single sub-mandibular vocal sac with longitudinal paired apertures bounded by the anterior cornua, and glandular but completely unpigmented nuptial pads.

The dorsum is a very pale brown, on which there are four narrow, but conspicuous, longitudinal black stripes. The median pair commences on a level with the anterior margins of the upper eyelids and extends to the femora. The lateral stripes extend from the tip of the snout to the inguinal region. In addition there is a very narrow and much less conspicuous mid-vertebral stripe, and a pair of short dark stripes on each side of the cloaca, extending to a position anterior to the level of the femora. There is a dark stripe on the outer margin of the forearm and a pair of more conspicuous dark stripes on the dorsal surface of the tibia and the tarsus. The post-labial gland is white and the ventral surfaces of the body and limbs are dull cream and immaculate.

**Dimensions:** Snout to vent length 29.9 mm; tibia length 12.2 mm; head length 9.5 mm; head width 8.6 mm; eye to naris distance 2.6 mm; internarial span 2.3 mm; eye diameter 3.1 mm; tympanum diameter 1.9 mm.

**Variation:** The paratype series consists of twelve adult males (MCZ 86014-21; SAM R13490-93), collected at Merauke with the

2



Fig. 2. *Litoria quadrilineata* in posed position shortly after preservation.

holotype. They differ only slightly in size, the snout to vent length range being 27.1–30.0 mm, with a mean of 28.8 mm. The limbs are consistently very short (TL/S-V ratio 0.39–0.44) and the body slender. The HL/HW range is 1.100–1.143 and the E-N/IN range 1.125–1.182. Figure 2 is of a freshly killed specimen in a posed position.

Vomerine teeth are present on distinctly raised vomerine elevations; the vomerine elevations may be present and teeth absent or both elevations and teeth entirely absent.

The post-labial gland is present and conspicuous in ten paratypes but is entirely lacking in two. Although all specimens have the skin of the throat gently convoluted and folded, indicating a period of prolonged vocal activity prior to collection, the nuptial pads are unpigmented.

In preservative the four longitudinal stripes are present throughout the series, the specimens differing only slightly in the background coloration: some being dark brown and others a sandy brown.

The description of colour in preservative was prepared within only a few weeks of their collection. Living specimens differed principally in that the anterior and posterior surfaces of

the thighs were bright red and the skin of the throat a deep yellow. The portion of the iris above the pupil was pale brown and that below it dark brown.

*Comparison with other species:* *Litoria quadrilineata* can be readily distinguished from all other species currently known to occur in New Guinea, but its phylogenetic relationships are difficult to establish.

Ignoring the possession of the four dark longitudinal stripes, which are not exhibited by any previously described species, the size and general proportions are consistent with those exhibited by members of the *Litoria rubella* complex. This group, as defined by Tyler (1968), comprises *L. congenita*, *L. capitula*, *L. rubella* and *L. wisselensis*. All are of moderate size (snout to vent length rarely exceeding 35 mm) and have short limbs. Distinct markings in these species, when present, trend towards the lateral orientation so clearly depicted by *L. quadrilineata*. Where *L. quadrilineata* differs from the members of the *L. rubella* group most conspicuously is in the nature of the digits in terms of length, proportion of digits and webbing. In these respects the only hylids with feet resembling those of *L. quadrilineata* are the south-eastern Australian species *L. brevipalmata* and *L. citropa*,

neither of which exhibit other obvious affinities to it.

In the key to Papuan *Hyla* (Tyler 1968) (now *Litoria*, vide Tyler 1971), *L. quadrilineata* keys most closely to *L. jendei*. The latter species lacks longitudinal markings, has a higher TL/S-V ratio (0.48, as opposed to 0.39–0.44 in *L. quadrilineata*) and a considerably longer snout (E-N/IN 1.435 in *L. jendei* and 1.125–1.182 in *L. quadrilineata*).

*Litoria quadrilineata* is a highly distinctive New Guinea hylid frog, and there is currently no evidence of a particularly close phylogenetic relationship with any other species known from the island.

**Habitat:** The series was collected on a plot of low-lying, swampy vacant land in the township, amongst matted grass above and adjacent to water. Collecting in similar habitats occurring to the east and south-east of the township yielded other species of *Litoria*, but no further representatives of *L. quadrilineata* were observed or heard calling there.

**Call:** Most of the specimens were calling when collected. They were in a horizontal position on the grass producing a low-pitched buzz-like call of approximately 2–3 seconds duration. The species was by no means timid, continuing to call when illuminated by a spotlight.

#### ***Ranidella remota* n.sp.**

*Crinia signifera*, Roux (1920).

*Crinia signifera signifera*, Parker (1940) (part).

**Holotype:** SAM R13524. A gravid female collected at Morehead, Papua New Guinea by F. Parker on 18 June, 1972.

**Definition:** A small lowland species (males 13.2–15.6 mm; females 14.3–18.7 mm S-V) characterised by its short and rather rounded snout, lack of a tympanum, and smooth or weakly granular abdominal skin.

**Description of holotype:** Maxillary teeth present. Vomerine teeth absent. Snout short, blunt and rounded when viewed from above and in profile, and not projecting conspicuously. Eye to naris distance slightly less than the internarial span (E-N/IN 0.80). Canthus rostralis poorly defined and straight, loreal region slightly concave. Tympanum absent.

Fingers relatively long, unwebbed and unfringed, with well developed subarticular tubercles. Hind limbs short (TL/S-V 0.44). Toes long, unwebbed and with very slightly developed lateral fringes. A small inner but no outer metatarsal tubercle.

Dorsal surface of head, body and limbs covered with very small tubercles. Throat smooth, abdomen very slightly granular. A glandular post-labial area.

The dorsal surfaces of the body and limbs are dark grey with a pair of pale creamish dorsal stripes extending from the scapular to the coccygeal regions. The ventral surface is pale cream with a uniform, but very sparse, faint grey stippling.

**Dimensions:** Snout to vent length 16.5 mm; tibia length 7.3 mm; head length 7.2 mm; head width 6.1 mm; eye diameter 2.2 mm; eye to naris distance 1.2 mm; internarial span 1.5 mm.

**Variation:** There are 24 paratypes consisting of 6 adult females (3 of them gravid), 9 males (8 adult), and 9 juveniles: MCZ 86119–21, SAM R13527–28, Gubam, 16.vi.1972; UPNG 1190, Morehead, 28.i.1969; AMNH 88031–32, SAM R13525–26, R13681–82, UPNG 3847–50, MCZ 86127, Morehead, 19.v.1969; MCZ 86122–26, NMB 3180, Meranke 1920; Morehead 18.vi.1972; MCZ 86128, Mata, 19.vi.1971. Of the paratypes UPNG 1190 was collected by J. J. Menzies, NMB 3180 by P. Wirz and the remainder by F. Parker. A living specimen is depicted in Figure 3.

An additional 8 specimens (MCZ 86111–18) were found in the stomach of a specimen of the colubrine snake *Amphiesma nairii* collected by F. P. at Morehead on 18.vi.1972. These specimens are identifiable as *R. remota*, but are so misshapen that it has proved impossible to obtain measurements or any other data from them. Because they have in no way contributed to our knowledge of the species and have not been taken into account in our assessment of variation, we have not accorded them paratype status.

Snout to vent lengths of the adult males vary from 13.2–15.6 mm; gravid females vary from 15.5–18.7 mm; the smallest juvenile 10.4 mm. Variation in proportions of the adults in the paratype series are as follows: TL/S-V 0.44–0.50; III/HW 1.09–1.27; E-N/IN 0.80–1.00.

Polymorphism in terms of dorsal skin texture as defined by Parker (1940) and Main (1957) involves the smooth, lyrate and warty morphs in the ratio of 8:5:10. Variation in dorsal appearance of most adults involves the pair of longitudinal stripes exhibited by the holotype. They vary only in their intensity and extent of contrast from the dull general dorsal colouration.

3



Fig. 3. *Ranidella remota*.

Ventral markings are confined to very fine and quite uniform stippling in all specimens, except for one adult in which the throat and pectoral regions are densely pigmented with black, and bisected by a narrow, median unpigmented line.

In life the dorsum is either predominantly grey or brown, the throat and ventral surfaces of the limbs grey, and the abdomen white. The portion of the iris above the pupil is gold and the portion below grey.

*Call:* Males call from a horizontal position on the ground, usually beneath a leaf or some other form of cover. The animals appear ventriloquial, making it difficult to locate them, particularly because they cease calling when disturbed.

Data on the male mating call structure are based on recordings made by J. I. Menzies of UPNG 1190 calling amongst flooded grass tussocks by the river at Morehead on 28.i.1969.

A sonagram of this call is depicted in Figure 4, showing a dominant frequency of 4250 Hz, a duration of 720 milliseconds, and being composed of 14 pulses with an individual pulse duration of approximately 28 milliseconds.

Menzies (pers. comm.) reports that there are from 12 to 15 pulses per call and that the last two or three tend to have a shorter duration: the acoustic impression is one of a series of short buzzes.

*Comparison with other species:* The status of the populations of *Ranidella* occurring in the Northern Territory and in northern Queensland are currently unknown. Although it would be preferable to have these populations defined and described before describing what constitutes the northern peripheral member of the genus, we seek only to establish that the population that we describe here is new. Thus, although a close phylogenetic relationship may ultimately be demonstrated with such northern Australian species, we are now only able to distinguish *R. remota* from those species that have been described.

Morphologically *R. remota* firstly must be compared with the species known to occur in Queensland: *R. signifera*, *R. parinsignifera*, and *R. tinnula*. Absence of a tympanum and the greatly reduced pigmentation of the ventral surface distinguishes *R. remota* from each of these species. *Ranidella tinnula* is also shown by Straughan & Muir (1966) to have a

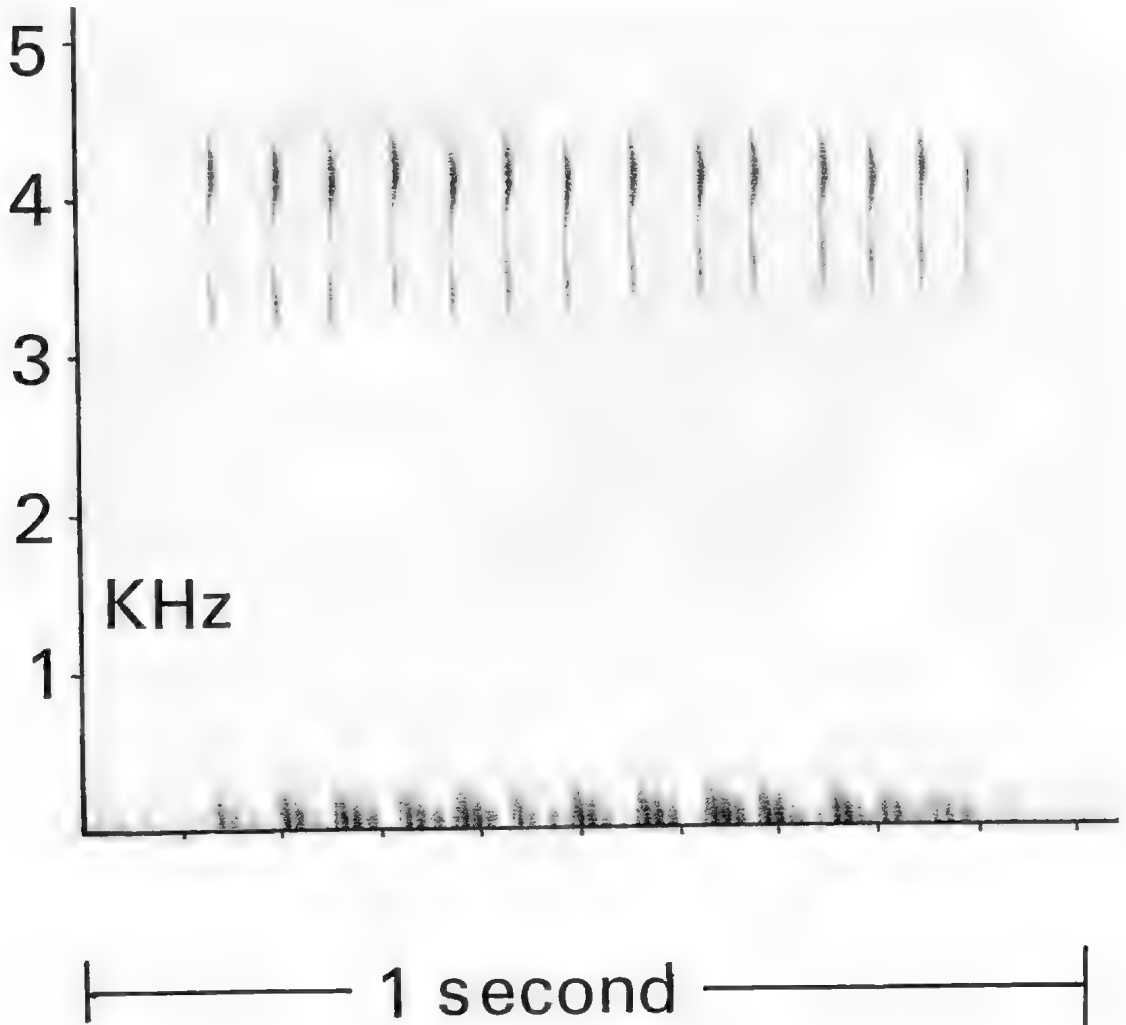


Fig. 4. Sonogram of mating call of *Ranidella remota*.

conspicuous snout, greatly projecting in profile, contrasting with the gently rounded snout profile of *R. remota*.

*Ranidella signifera* extends from southern Queensland to the southern portion of South Australia. Many of the specimens from the western portion of the range have reduced ventral pigmentation, but the species is consistently larger. Ranges of snout to vent length for *R. signifera* derived from Littlejohn (1963) and Littlejohn & Martin (1965) are: males 18.0–24.2 mm; females 19.0–27.7 mm.

*Ranidella riparia* of the Flinders Ranges in South Australia is the only Australian species known to lack a tympanum. This species is also consistently larger than *R. remota* with

snout to vent length ranges of 19.5–25.2 (males) and 23.0–25.2 (females). It also has extensive ventral pigmentation and further differs from *R. remota* in possessing broadly fringed toes.

The most striking characteristics of the mating call of *R. remota* are its long duration of 720 msec and the number of pulses (14). Within *Ranidella* this duration is considerably greater than the ranges of all except one of the species summarised by Littlejohn (1959) and Littlejohn & Martin (1965). The upper limit of *R. riparia* is quoted at 497 msec, but it is the south-western Australian species *R. glauerti*, with its maximum call duration of 820 msec which surpasses *R. remota*. *Ranidella glauerti*

differs in its pulse frequency (7-12). The nature of the call differences between *R. remota* and *R. glauerti* are not considerable. Of the described Queensland species it is worth noting that the call duration of *R. tinnula* is less than 100 msec. The pulse rate of *R. remota* is relatively low but such low rates are, in *Ranidella*, associated with a particularly short duration in the species compared by Littlejohn (1959).

*Habitat and habits:* In the Morehead and Weam areas, *R. remota* was found in areas of low mixed savannahs, particularly along the fringes of low-lying grass-covered flats having a grey clay soil. The occurrence of the species in low monsoon scrubland and tall mixed savannahs was restricted to the area around Balumuk.

*Ranidella remota* was usually found away from permanent water, and was observed to be a secretive species living beneath leaf litter and amongst grass on damp soil, but was not found beneath logs or bark fragments on the ground. It appears to be predominantly nocturnal, although it has been observed hopping amongst grass on days when the skies were overcast.

#### Acknowledgments

We are indebted to Mr. J. I. Menzies (University of Papua New Guinea) for permission to reproduce the sonagram of *R. remota*, to Dr. L. Forcart (Naturhistorisches Museum Basel) for the loan of a specimen, to Miss M. Anstis for preparation of the line drawings and to Dr. J. Ling for reading the manuscript.

#### References

- BLAKE, A. J. D. (1973).—Taxonomy and relationships of myobatrachine frogs (Leptodactylidae): a numerical approach. *Aust. J. Zool.* 21, 119-149.
- LITTLEJOHN, M. J. (1959).—Call differentiation in a complex of seven species of *Crinia* (Anura: Leptodactylidae). *Evolution* 13 (4): 452-468.
- LITTLEJOHN, M. J. (1963).—Frogs of the Melbourne area. *Vic. Nat.* 79 (10): 296-304.
- LITTLEJOHN, M. J., & MARTIN, A. A. (1965).—A new species of *Crinia* (Anura: Leptodactylidae) from South Australia. *Copeia* 1965 (3): 319-324.
- MAIN, A. R. (1957).—Studies in Australian Amphibia I. The genus *Crinia* in south-west Western Australia and some species from south-eastern Australia. *Aust. J. Zool.* 5, 30-55.
- MOORE, J. A. (1954).—Geographic and genetic isolation in Australian Amphibia. *Amer. Nat.* 88, 64-75.
- PARKER, H. W. (1940).—The Australasian frogs of the family Leptodactylidae. *Novit. Zool.* (42), 1-106.
- ROUX, J. (1920).—Note sur la présence du genre *Crinia*, amphibien cystignathide, en Nouvelle-Guinée. *Rev. Suisse Zool.* 28 (5), 115-117.
- STRAUGHAN, I. R. & MAIN, A. R. (1966).—Speciation and polymorphism in the genus *Crinia* Tschudi in Queensland. *Proc. R. Soc. Qld* 78 (2), 11-28.
- TYLER, M. J. (1968).—Papuan hylid frogs of the genus *Hyla*. *Zool. Verh.* (96), 1-203.
- TYLER, M. J. (1972a).—An analysis of the lower vertebrate faunal relationships of Australia and New Guinea. In D. Walker (Ed.) "Bridge and Barrier: the Natural and Cultural History of Torres Strait." (Dept. Biogeography and Geomorphology, Publ. BG/3 Australian National University, Canberra.)
- TYLER, M. J. (1972b).—A new genus for the Australian leptodactylid frog *Crinia darlingtoni*. *Zool. Meded., Leiden* 47, 193-201.
- TYLER, M. J., & MENZIES, J. I. (1971).—A new species of microhylid frog of the genus *Sphenophryne* from Milne Bay, Papua. *Trans. R. Soc. S. Aust.* 95 (2), 79-83.
- TYLER, M. J. & PARKER, F. (1972).—Additions to the hylid frog fauna of New Guinea, with description of a new species, *Litoria timida*. *Trans. R. Soc. S. Aust.* 96 (3), 157-163.
- VAN KAMPEN, P. N. (1923).—The Amphibia of the Indo-Australian Archipelago. (Brill: Leiden.)